

REMARKS

Applicant respectfully requests reconsideration of this application in view of the foregoing amendments and following remarks.

Status of the Claims

Claims 24, 26, 30, 31 and 35-39 are pending in this application, of which claims 24, 30 and 31 are independent. All of the pending claims stand rejected. By this amendment, claims 24, 26, 30, 31 and 35-39 are amended. New claims 40-42 are added. No new matter has been introduced by this amendment.

Rejections under 35 U.S.C. §112

In paragraph eight (8) of the Office Action, claims 24, 26, 30, 31 and 35-39 have been rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. In paragraph nine (9) of the Office Action, claims 26 and 35-39 have been rejected under 35 U.S.C. §112, first paragraph, as they depend from the claims rejected under the same category.

In rejecting claims 24, 30 and 31, the Examiner indicates, *inter alia*, that each of the secondary images (e.g., 1702, 1703 and 1704) are not obtained out of the obtained image (i.e., 1701) by shifting the pixels of the obtained image 1701, but obtained by shifting pixels from the obtained image by adjusting the position of the optical unit.¹

Independent claims 24, 30 and 31 have been amended for further clarification. In particular, each of claims 24, 30 and 31 has been amended to recite that an optical unit has been shifted to shift the pixels of the original image to generate a secondary image. For example, amended claim 24 recites, *inter alia*, “a shift unit, arranged to shift an optical unit to shift pixels

¹ Page 14 of the Office Action.

of the original image thereby generating a secondary image having pixels of the plurality of color components shifted from pixels of the plurality of color components of the original image.”

Applicant notes that the original specification teaches that the driving amount of the optical unit 4 (as shown in, e.g., Fig. 19) corresponds to a pixel pitch P of the imaging unit 6. See, e.g., paragraph [0188] of the corresponding published application (i.e., U.S. Pub. No. 2004/0085460 A1).

Applicant believes that each of amended claims 24, 30 and 31 overcome the rejection under this category. Reconsideration and withdrawal of the rejections of claims 24, 30 and 31 under 35 U.S.C. §112, first paragraph, is respectfully requested.

Rejections under 35 U.S.C. §103

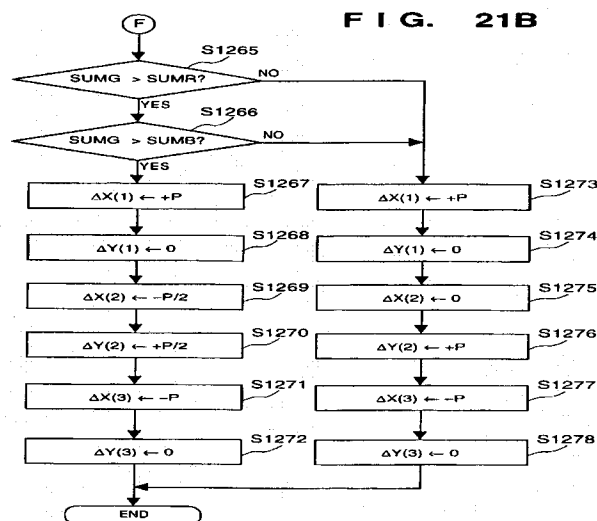
In paragraph thirteen (13) of the Office Action, claims 24, 26, 30, 31, 35 and 37-39 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,108,036 to Harada et al. (“Harada”) in view of U.S. Patent No. 6,266,086 to Okada et al. (“Okada”) and further in view of JP 07-107369 A to Kaneda (“Kaneda”).

Claims 24, 30 and 31 have been amended for further clarification. Amended claim 24 recites:

24 (*Currently Amended*): An imaging apparatus comprising:
an imaging unit, arranged to form an object image and generate an original image by a photoelectric conversion of the object image;
a detector, arranged to detect spatial frequency characteristics of a plurality of color components of the original image;
a controller, arranged to designate data format and control supply of the original image to a storage unit in correspondence with the detected spatial frequency characteristics of the plurality of color components of the original image;
a shift unit, arranged to shift an optical unit to shift pixels of the original image thereby generating a secondary image having pixels of the plurality of color components shifted from pixels of the plurality of color components of the original image; and
a generator, arranged to generate a combined image by combining the original image with the secondary image,
wherein said shift unit changes a shift amount of the optical unit in correspondence with a result of comparison between the spatial frequency characteristics of the plurality of color components of the original image detected by said detector. [Emphasis added]

Each of claims 30 and 31 is amended in a similar manner to claim 24 described above. Support for the amendment may be found, e.g., paragraphs [0186]-[0199] of the corresponding published application (i.e., U.S. Pub. No. 2004/0085460 A1).

Amended claim 24 is directed to an imaging apparatus capable of analyzing the spatial frequency characteristics of the color components (e.g., R, G, B) of a reference image (e.g., an original image), and generating a secondary image having pixels shifted from the original image based on the analyzed result of the color components. For example, the high-frequency color components information of the green, red and blue data of the original image are calculated and stored in the registers (e.g., SUMG, SUMR, SUMB). Subsequently, these data are compared whether which color component is the highest in the original image. Based on the compared result, the pixel shifting method is determined. As an example and referring to Fig. 21B as reproduced below, when it is determined that the value of SUMG is the largest among the three color components as a result of the comparison, the pixel shifting is performed by following the steps of S1267~S1272.



After the shifting is performed and generating a secondary image, the original image and the secondary image are combined together (e.g., by an interpolation of the pixels in the two images) to generate a combined image. With the features of the present invention as discussed above, a high-resolution image can be captured with low cost (e.g., a camera with a low resolution CCDs). See, e.g., paragraph [0211] of the corresponding published application.

Harada discloses an imaging apparatus adapted to pick up both a motion image and a still image. Okada discloses an imaging apparatus having a control circuit capable of shifting the image based on a moving amount of the subject image. Although Applicant believe that there are many other differences between the teachings in the two cited references (i.e., Harada and Okada) and the present invention as recited in amended claim 24, the Office Action at least correctly admits that “the combined teaching of Harada et al. in view of Okada et al. fails to teach that the shift amount of the pixels in each of the plurality of secondary images in correspondence with a result of comparison between the spatial frequency characteristics of the plurality of color components of the image detected by said detector.”² The Office Action then cites Kaneda as disclosing this missing element from Harada and Okada. The Office Action describes that:³

However, Kaneda discloses the concept of detecting movement of the camera based on a result of comparison between the spatial frequency characteristics of the plurality of color components of the image detected by said detector. Kaneda discloses a camera (See fig. 1) comprising a lens moving mechanism (Fig. 1: 133) that adjusts the position of the lens based on a motion detected, wherein said motion is detected based on an effective spatial frequency component of an image beng captured to obtain the motion vectors between images (This teaches that the movement of the lens is based on a result of comparison between the spatial frequency characteristics of the plurality of color components of the image detected by said detector) See Machine English Translation, page 3, ¶ 0008, page 4, ¶ 0012; page 5, ¶ 0018 – page 7, ¶ 0025; page 8, ¶ 0028-0031).

² Page 22 of the Office Action.

³ Pages 22-23 of the Office Action.

Kaneda discloses an image processor capable of correcting the image shake even when the image shake exists over a detecting area. It is indicated in Kaneda that “[a] motion vector between pictures are detected from the image signal of an object based on a correlation arithmetic between the images which time sequentially continue by a step S201 and the shaking status of the image is detected by a step 203 based on motion information of the absolute value, the spatial distribution, time distribution etc., of plural motion vectors calculated by a step S202.” See the English Abstract of Kaneda.

However, as Applicant understand it, Kaneda fails to teach that “the shift amount of the pixels in each of the plurality of secondary images in correspondence with a result of comparison between the spatial frequency characteristics of the plurality of color components of the image detected by said detector,” as the Examiner asserts. For example, the detected value in Kaneda is the spatial distribution of the “motion vector”, but not the spatial frequency characteristics of “color components” as recited in claim 1. A portion of Kaneda cited by the Examiner describes that “[0030] Generally, when the amount of picture Bure is large, as the spatial distribution of the motion vector detector does not always become large with the amount of picture Bure...” Applicant believes that the motion vector is a substantially different subject matter from the color components which deals with the color data (e.g., red, green and blue) in the image.

Accordingly, each of claims 24, 30 and 31 as amended is believed neither anticipated by nor rendered obvious in view of the cited references (i.e., Harada, Okada and Kaneda), either taken alone or in combination, for at least the reasons discussed above. Reconsideration and withdrawal of the rejections of claims 24, 30 and 31 under 35 U.S.C. §103(a) is respectfully requested.

Applicant has chosen in the interest of expediting prosecution of this patent application to distinguish the cited documents from the pending claims as set forth above. However, these statements should not be regarded in any way as admissions that the cited documents are, in fact, prior art. Also, Applicant has not individually addressed the rejections of the dependent claims because Applicant submits that the independent claims from which they respectively depend are in condition for allowance as set forth above. Applicant however reserves the right to address such rejections of the dependent claims should such be necessary.

New claims 40-42 have been added to recite the claimed invention in an alternative manner. Specifically, each of claims 40-42 depends from claims 24, 30 and 31, respectively, and is accordingly believed allowable for at least the similar reasons discussed above for claim 24. Support for the new claims may be found, e.g., at paragraph [0188] of the corresponding published application.

Applicant believes that the application as amended including the new claims is in condition for allowance and such action is respectfully requested.

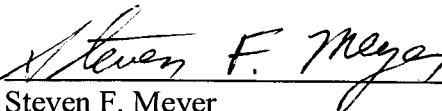
AUTHORIZATION

No petitions or additional fees are believed due for this amendment and/or any accompanying submissions. However, to the extent that any additional fees and/or petition is required, including a petition for extension of time, Applicant hereby petitions the Commissioner to grant such petition, and hereby authorizes the Commissioner to charge any additional fees, including any fees which may be required for such petition, or credit any overpayment to Deposit Account No. 50-4827 (Order No. 1004288.4495A). A DUPLICATE COPY OF THIS SHEET IS ENCLOSED.

An early and favorable examination on the merits is respectfully requested.

Respectfully submitted,
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Dated: April 23, 2009

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